Effects Analysis

This section presents the analysis of effects required under Section 7 of the ESA. Because consultation on essential fish habitat (EFH) is different from ESA consultation, the discussion of potential project effects on essential fish habitat should be presented in a separate document included as an Appendix to the BA.

After providing project and species information in sufficient detail to define the proposed action and the potential occurrence of species in the project action area, the BA must provide an analysis of the potential effects of the project upon listed and proposed species as well as designated or proposed critical habitat. The topics addressed in the Effects Analysis section include the following:

- Direct effects
- Indirect effects
- Effects of interrelated and interdependent actions
- Cumulative effects (formal consultation only)
- Compliance with existing recovery or management plans
- Potential for the project to result in incidental *take* of listed species
- Potential for the project to jeopardize continued existence of proposed species or adversely modify critical habitat.

Although the ESA does not require the BA to analyze effects on candidate species, providing an assessment for these species is highly recommended. Addressing these species at the outset simplifies updating the BA in the event that the project is postponed, or when candidate species are upgraded to proposed or listed status. This information should be placed in an appendix to the BA.

In the Effects Analysis section, the project biologist should describe anticipated *take* (as defined under the ESA) in terms of these three factors:

- The estimated number of individuals affected
- Whether the affected individuals are adults, juveniles, or both
- How the individuals will be affected, based on the endpoints discussed.

For some species, such as fish species, it is difficult or impossible to estimate the number of individuals affected, but the project biologist can address the impact in terms of space and time (e.g., all adult bull trout migrating through river mile 1 to 5 of John Doe Creek in November 2005). Construction activities that are likely to prevent reproduction, foraging during nesting, or migration to a spawning or nesting area may result in *take* of juveniles. The project biologist may be able to estimate the future number of juveniles based on historical records.

Examples of activities that are likely to affect an individual animal's ability to survive, reproduce, forage, or seek shelter include those that interfere with access to spawning grounds, shelter from predators, cold-water refuge (if the species is dependent on cold-water), or foraging habitat.

When assessing impacts on critical habitat, the project biologist addresses the primary constituent elements (PCEs) outlined in the federal listing of the designated critical habitat unit. Discuss the predicted adverse effects and the extent of the effect for each individual PCE. Adverse effects can cause harm to any or all of the PCEs without reaching the level of *adverse modification*, which is equivalent to *jeopardy*.

Often, BAs lack a logical, adequate analysis of whether a project will or will not cause direct or indirect effects. Similarly, BAs often fail to establish whether these effects are significant or discountable. The potential for project-related adverse effects is often overlooked, particularly for projects with in-water work. For example, receiving a hydraulic project approval (HPA) permit and incorporating the conditions of the HPA into the conservation measures of the BA does not guarantee that there will be no adverse effect. The analysis of effects must be detailed and complete, providing enough information to substantiate the rationale underlying the project biologist's effect determination.

A USFWS reviewer provided WSDOT the following list of issues to help the project biologist understand the level of detail required to complete a thorough analysis of effects and to support a final effect determination, which in turn will expedite review of the BA by the Services. These issues should be considered before and during the site visit and analysis to ensure that information is compiled as efficiently, thoroughly, and systematically as possible.

- If a project is near a stream or river potentially containing listed, proposed, or candidate species, or proposed or designated critical habitat, then discussion, plans, and figures within the BA should include the following information, as appropriate, to support the effect determination:
  - Activities in relation to the ordinary high water mark (OHWM)
  - Cross-section and elevation views
  - Direction of flow
  - Amount and extent of fill or instream work (including rock and large woody debris placement)
  - Amount and extent of any vegetation removal.
- For a project near a wetland that is habitat for a listed species, the BA discussion, plans, and figures should include the following (at a minimum):
  - Delineation boundary as surveyed
  - Wetland categories
  - Amount or extent of any fill

- Amount or extent of any vegetation removal
- Location of any compensatory mitigation areas.

- If a project is located near a wetland that does not provide these habitat functions, the discussion of impacts should be kept to a minimum.
- If the project is located in a watershed that may contain bull trout, and anadromous fishes have access to aquatic habitats in the project action area, assume the presence of bull trout.
- If a project will create sediment, the BA should address the following questions:
  - Will sediment input be measurable?
  - Will it be a teaspoon or truckload? Quantify the impact.
  - Will potential impacts include disruption of migratory patterns, degradation of stream habitat, or impacts on forage fish species?
- If a project will have short-term adverse impacts related to dewatering, diversions, fish handling, or temporary sediment input, adverse effects must be evaluated. Remember that impacts to listed species cannot be mitigated (i.e., there is no mitigation allowed for adverse impacts to listed species). Rather, the proposed action should include minimization measures that effectively minimize the adverse effects.
- If a project is treating highway runoff, treatment facilities should be included within the footprint of the project. The BA should answer these questions:
  - How much new impervious surface area is treatment being provided for?
  - How much of the existing impervious surface area is treatment being provided for?
  - What are the proposed highway runoff treatment measures for quality and quantity?
  - Infiltration is still preferred by the Services.
- A BA should also include information on any relevant conservation measures. and should discuss how the action agency can ensure that the contractor will comply (the Services cannot consult on recommended conservation measures or BMPs; they must be implemented as part of the proposed project):
  - Monitoring plans
  - Contingency plans
  - Maintenance plans
  - BMPs to be implemented during project construction and operation.
- If a project requires in-water work, it is important to analyze the types of impacts on suitable fish habitat and critical habitat that may result from the

proposed action. Discuss the in-water activities specifically and in detail. The following topics should be considered:

- Total area to be covered by riprap, and the portion of riprap above or below the OHWM
- Type and amount of vegetation being removed (especially riparian)
- Plans to incorporate vegetation or rootwads into the riprap
- Quantity of sediment generated and imported into water bodies
- Any potential take associated with placement activities
- Method of placement
- Impacts on relevant indicators (e.g., floodplain connectivity, width-to-depth ratios, stream bank condition)
- Acceleration of erosion rates and energy transfer to downstream environments
- Effects on instream habitats
- Riprap classification
- Existing conditions
- Post-project conditions
- Specific BMPs to be implemented by project proponents to minimize impacts
- Any proposed enhancement actions for the species habitat (usually these beneficial effects are non-contemporaneous)
- Discussion of activities in relation to all fish life stages.

- For a project that may have an impact on terrestrial species, the project biologist should quantify the following types of predicted impacts, insofar as possible:
  - Vegetation to be removed or altered by the proposed action
  - Whether suitable habitat will sustain impacts and to what extent
  - Whether critical habitat will sustain impacts and to what extent
  - Whether project noise will increase ambient noise levels above the existing threshold, potentially influencing the behavior of birds or wildlife in the vicinity of the project.
- A detailed quantitative description of these impacts is required in order to give reviewers a clear sense of what the direct impacts of the project entail. Topics a project biologist might address in this section include (but are not limited to) the following:
  - Number of nest trees to be removed or affected

- Distance of these trees from the project area
- Number of trees with suitable murrelet platforms in the action area
- Anticipated extent (i.e., range, level, and duration) of construction-related noise impacts
- Distance of known den sites, rendezvous sites, and prey concentration areas from the action area
- Suitability of habitat for listed species, and anticipated impacts
- Extent of impacts on suitable habitat
- Timing of the project in relation to species use of the area.

The analysis of effects should be completed separately for each listed species to facilitate making effect determinations for each species, to be consistent with the new WSDOT BA form, and to acknowledge that the project may affect various species differently. For example, the direct effects, indirect effects, effects associated with interrelated and interdependent actions, and cumulative effects should be analyzed for bull trout, then for bald eagle, then for chinook salmon, and so on. The specific subsections included in the analysis of effects, as required under the ESA, are discussed below.

Direct Effects

Direct effects are defined as "direct or immediate effects of the project on the species or its habitat." This section of a BA addresses the potential for direct impacts on species (listed or proposed), suitable habitat, critical habitat, and food resources in the vicinity of the project. Follow this link to access the Direct Effects section of the BA Form.

Direct effects include all immediate impacts (adverse and beneficial) from project-related actions (e.g., construction-related impacts such as noise disturbance or loss of habitat) and those disturbances that are directly related to project elements that occur very close to the time of the action itself (e.g., sedimentation).

Terrestrial Environment

When examining direct effects on wildlife and plants, identify and quantify all impacts anticipated to result from construction, including but not limited to disturbances from noise, visual impacts, vibration, and human activity levels during construction. Injury or disturbance thresholds associated with different noise levels have recently been established by USFWS (2003) for murrelets, bald eagles, and spotted owls (refer to Noise Impact Assessment for more information on this topic). Refer to the Wildlife Sensitive Periods Calendar to determine whether the project occurs during the breeding period or another sensitive period for nearby wildlife. Placing timing restrictions on a project to avoid work during these sensitive periods can minimize or avoid direct impacts on listed species. Biologists may be able to correctly identify listed plants in the field only when species are in bloom. See the Identification Window for Threatened and Endangered Plants in Washington State for guidance.

When examining direct effects on habitat for wildlife and plants, provide a description of suitable and critical habitat in the project action area. In addition, provide a description of other habitat types also found within the project action area. Discuss whether these habitats are occupied by a listed species. Quantify impacts on habitat in and surrounding the proposed project (e.g., acreage of clearing and grubbing, cut and fill, and number of trees removed). Identify clearly whether the project will have an impact on suitable or critical habitat, or whether species will be disturbed or displaced as a result of these impacts (e.g., their behavior is affected, access to habitats is cut off, or a portion of their habitat is lost). The effects of the action on existing environmental conditions should be evaluated and systematically documented.

Aquatic Environment

When examining direct effects on fish, identify and quantify all impacts on aquatic systems that are anticipated, including but not limited to sedimentation and the extent and duration of in-water work. Determine the run timing for listed fish in the vicinity of the project by contacting the WDFW local area habitat biologist or other local experts. Impacts on fish can be minimized or avoided by conducting work outside sensitive time periods (spawning, rearing, or migration) or when fish are not present in the vicinity of the project.

Identify and quantify all impacts on aquatic habitats, including but not limited to placement of riprap (note its position in relation to the OHWM), removal of riparian vegetation, sediment disturbance, and underwater noise impacts related to pile driving. Clearly identify whether the affected habitats are critical habitats or provide habitat for important life history stages (i.e., spawning, rearing, and migrating).

For aquatic species, the effects of the action on the environmental baseline conditions in the project action area should be evaluated and systematically documented. If bull trout occur in the vicinity of the project, the USFWS baseline indicator checklist should be completed. If salmonids regulated by NOAA Fisheries occur in the project action area, the NOAA Fisheries checklist should be completed (see Environmental Baseline, for a more detailed discussion of this topic.). When both NOAA Fisheries and USFWS freshwater species are present, environmental baseline conditions can be summarized in a single combined matrix.

These pathways and indicators matrices apply only to freshwater riverine areas. When evaluating marine or lacustrine systems and species, be sure to identify existing environmental conditions in the project action area, describe them in detail and explain how these conditions relate to the species evaluated, and document how they will be influenced by the proposed action.

If the project will result in beneficial direct effects, such as improvement of spawning substrate in the action area resulting from the addition of suitable spawning gravels, include a discussion of these effects in the Direct Effects section of the BA.

Indirect Effects

Indirect effects include those effects that are caused by or will result from the proposed action and are later in time (generally after the construction period), but are still reasonably certain to occur. Indirect impacts may result from the operation of the project or future activities related to the project (e.g., future impacts from trail use, induced land use change or growth, increased traffic). The BA must examine these continued impacts in order to ascertain overall project-related impacts. Indirect impacts (adverse and beneficial) from the proposed actions are assessed for species as well as suitable and critical habitats. The analysis of indirect effects can be complex and should include an assessment of the impacts related to the following issues:

Does the project create a new facility (e.g., a new road or interchange) or increase the capacity of or access to the existing system?
Is surrounding development contingent on the proposed project? In some cases developments are tied by permit condition or Growth Management Act concurrency to certain transportation improvements.
Is any anticipated future development the result of (caused by or dependent on) the project?

Indirect effects are analyzed within the defined action area for a project. The *zone of influence*, which is defined for project-related traffic and development issues, may help to define the limits of the action area. The process of indirect effects analysis and defining the zone of influence is summarized in *Guidance for Preparing Biological Assessments: ESA, Indirect Effects, Transportation and Development* (WSDOT 2001, revised in 2003). The following link, Indirect Effects, provides a more detailed discussion of indirect effects analysis and includes this guidance. Follow this link to access the Indirect Effects section of the BA Form.

If the project will result in beneficial indirect effects, include a discussion of them in the Indirect Effects section of the BA. Beneficial indirect effects might include improved water quality resulting from new stormwater treatment elements installed as part of a project. Another example of a beneficial indirect effect would be providing access to habitat by repairing a fish passage barrier.

Effects of Interdependent and Interrelated Actions or Activities

Authors often mistakenly refer to interdependent or interrelated *effects or impacts*. This section of a BA should discuss effects resulting from interdependent or interrelated *actions* or *activities* associated with the proposed project.

An interdependent activity is an activity that has no independent utility apart from the proposed action.

An interrelated activity is an action that is part of a larger action and depends on the larger action for its justification. The proposed action itself can be part of a larger action, or may require additional related actions for its completion.

To determine whether an activity is interrelated with or interdependent upon the proposed action under consultation, the but-for test can be applied (i.e. the interrelated or interdependent activity would not occur *but for* the proposed road construction project). Though effects associated with interrelated or interdependent actions are often indirect effects, they are not limited to indirect effects.

Follow this link to access the applicable section of the BA Form.

Summary of Impact Avoidance and Minimization Measures

The BA should provide the reviewer with a consolidated list of construction-related and species-related conservation measures for easy reference when examining the effect determination section of the BA. Follow this link to access the Impact Avoidance and Minimization Summary section of the BA Form.

Cumulative Effects

There is a difference between the definitions of cumulative impacts associated with the ESA and NEPA. NEPA requires a cumulative impact analysis to address future federal, state, local, and private actions. ESA requires analysis of only future state, local, and private actions, but not federal.

Under the ESA, cumulative effects are the effects of future state, local, or private (but not federal) activities (unrelated to the proposed project) that are reasonably certain to occur within the action area of a proposed project. Unlike direct and indirect effects, or interrelated or interdependent actions, cumulative effects do not influence or define the limits of the action area. Rather, the action area defined by the extent of impacts from these other activities defines the geographic scope for the cumulative effects analysis.

A future activity is reasonably certain to occur if examination of economic, administrative, or legal hurdles and plans indicates that it is likely to occur; implementation of the activity need not be guaranteed.

Cumulative effects analyses are required by the ESA only for those projects undergoing formal consultation (LTAA BAs). Officially, the U.S Army Corps of Engineers defines adverse effect (LTAA) reports as *biological assessments* and NLTAA reports as *biological evaluations* or BEs (which do not require a cumulative effects analysis). However, in practice, the Corps uses these terms interchangeably.

The cumulative effects analysis does not weigh into the project's effect determination for listed and proposed species and habitats. This analysis is included in the BA for evaluation

by the Services of the cumulative effects of the project upon the species as a whole. Follow this link to access the Cumulative Effects section of the BA Form.

A cumulative effects analysis should include the following:

- Provide a description and an analysis of the effects of actions that are cumulative to the primary action but not related to it. Cumulative effects include the effects of future, local, state, or private activities, but not federal activities, which are reasonably certain to occur within the action area of the proposed project.
- Any research findings that are used in the analysis of the effects of an action should be cited. This adds to the credibility of the analysis.

Compliance with Existing Recovery or Management Plans

If recovery or management plans have been established in the project vicinity that would affect the species or ecosystems in the project action area, the BA should address to what degree the project is in compliance with these plans and their management recommendations. It should be noted that the project may not be in compliance with the recovery or management plan. This discrepancy should be addressed in the Analysis of Effects section of the BA.

Potential for Project to Result in Incidental *Take* of Listed Species

Under the ESA (16 U.S.C. §§ 1531 et. seq.), *take* is defined as:

To harass, harm, pursue, hunt shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct.

The potential for the proposed action to incidentally *take* a listed species should be discussed in detail in the BA. A *take* analysis should quantify the number of individuals or the amount of a species' habitat (occupied or designated critical habitat) likely to be lost as a result of the proposed project. The terms and conditions of the incidental *take* statement stipulate the number of individuals of a species that may be lost. *Take* is not allowed for the entirety of a listed species' habitat or designated critical habitat. *Take* provisions for proposed species or proposed critical habitat may be given in a conference report. (Conferences are required for federal actions likely to jeopardize proposed species or adversely modify proposed critical habitat, and the results are summarized in a conference report.) The *take* prohibition does not extend to candidate species.

The ESA does not limit or provide for the incidental *take* of listed plant species. However, listed plants are afforded some protection under the ESA in that a federal permit is required to remove, reduce population size, or possess endangered plants from areas under federal jurisdiction. A federal permit is also required for any act that would remove, cut, dig up, damage, or destroy any listed plant species in any other area in knowing violation of any state regulation or in the course of any violation of a state criminal trespass law.

Potential for Project to Jeopardize the Continued Existence of a Proposed Species or Result in Destruction or Adverse Modification of Proposed Critical Habitat

The federal action agency must ensure that its activities are not likely to jeopardize the continued existence of proposed species or result in destruction or adverse modification of proposed critical habitat.

For proposed species, the BA must analyze the potential for the project to jeopardize the continued existence of the species in relation to the impact analyses provided in the preceding sections (including direct effects, indirect effects, and interrelated and interdependent activities). This jeopardy analysis pertains to the entire species, not to individual animals. However, the provisional effect determination (i.e., NE, NLTAA, or LTAA) that accompanies the jeopardy analysis and conclusion reflects the potential for *take* of individual animals. As a result, a determination of LTAA does not necessitate a jeopardy call of *likely to jeopardize the continued existence* of a proposed species. A clear summary statement of the impacts affecting each proposed species should be included in the Conclusion and Effect Determination section of the BA, which should accompany the final effect statement for proposed species (see Effect Determination Guidance for more detailed information). If a project is *likely to adversely affect* (LTAA) a proposed species, a conference with the Services can be requested to secure provisional incidental *take* provisions. If the species became listed prior to completion of the project, the action agency would request that the formal conference be turned into a formal consultation.

For proposed critical habitat, the BA must analyze the potential for the project to affect proposed critical habitat as well as the project's potential for destroying or adversely modifying this habitat. The effect determination conveys whether any impacts on critical habitat will occur. The adverse modification determination assesses the functionality of the proposed critical habitat for a species as a whole. As a result, an LTAA determination does not necessitate a modification determination of *destroy or adversely modify proposed critical habitat*. A clear summary statement of the impacts affecting proposed critical habitat should be included in the Conclusion and Effect Determination section of the BA, which should accompany the final effect statement for proposed critical habitat (see Effect Determination Guidance for more detailed information). If a project is *likely to adversely affect* proposed critical habitat, a conference with the Services can be requested to secure provisional incidental *take* provisions.

The Services are available to assist the federal agency with this determination of effect. A conference can be requested for jeopardy findings on proposed species or adverse modification findings on proposed critical habitat. In addition, if a proposed species will become listed (or a proposed critical habitat will become designated) prior to the completion of the project, a conference can be requested from the Service on NLTAA effect calls (it is not required, however). This will allow the conference concurrence to turn into a consultation concurrence upon request at the time of listing. By including proposed species in the BA, the conference process is completed in conjunction with the consultation process.

Potential for Project to Affect Candidate Species

The analysis of impacts related to project actions can also include candidate species; however, this information is to be included in a BA appendix. The ESA does not require that BAs include an impact analysis of these types of species; however, because projects are frequently delayed by lack of funding or changing priorities, or are not constructed as scheduled, the status or location of a species may change and the BA may require updating. Because projects are often delayed, it is useful to provide a complete analysis of impacts on candidate species as well as listed species, in the event that candidates become listed in the course of the project.

In assessing potential impacts on these species, the project biologist should determine the presence of suitable habitat in or near the project during a site visit. The BA should document the level of use of the project site or vicinity by specific species. The project biologist should then assess direct and indirect impacts to determine project-related impacts upon individuals, populations, and essential habitat components. A clear summary should state whether the action will have significant impacts on populations, individuals, or suitable habitats (occupied or unoccupied). This summary statement (provided for candidate species) should be provided in the Candidate section in the appendix.